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SUMMARY

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POSSIBILITIES OF PRODUCING VISCOSE, RAYON AND NYLON FROM AVAILABLE LOCAL RAW MATERIALS AND BLENDS WITH NATURAL FIBRES

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No. 418 POSSIBILITIES OF PRODUCING VISCOSE
D.6.1. RAYON AND NYLON FROM AVAILABLE LOCAL RAW MATERIALS AND BLENDS WITH NATURAL FIBRES

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SUMMARY

The manufacture of man-made fibers started in the UAR in 1950 with the production of viscose rayon filaments. At the present the total production amounted to 6749 tons of continuous filament rayon and 4343 tons of staple fiber. In 1957 exportation started and increased year by year till it amounted in 1961 to 23% of the total production of filament yarn, 11.2% of viscose staple and 17.4% in cloth form.

Practically all the chemicals utilized in produced viscose rayon are manufactured locally with exception of cellulose wood pulp which is still imported. To render the industry self-independent, a study of the available agricultural waste products which could be used for production of cellulose pulp suitable for viscose production was carried out by the National Research Centre of the Republic, on the following:

a) Bagasse
b) Rice-straw
c) Cotton linters
d) Cotton waste
e) Eucalyptus wood
f) Reeds (Phragmites Communis)

Bagasse: The main results of research on bagasse showed that only 3% of the prohydrolyzed material has to be removed so as to reduce the ash content to suitable values and further removal of pith had no effect in reducing the ash or increasing the alpha-cellulose. In fact a suitable technique for the preparation of cellulose pulp of the required specification was worked out on a laboratory scale.

Rice straw: Rice straw is available in very large quantities but this straw is characterized by its high ash and silica contents amounting to about 20% and 15% respectively. Chemists of the National Research Centre found out that most of the ash and silica of the straw is attributed to the leaves and that most of it is located in the epidermal cells which constituted a small part of the leave structure. These cells alone had to be removed. By applying moderate pulping conditions especially for short periods at high temperature to the screened prehydrolyzed material the ash and silica of the pulps decreased and the yield increased considerably. The optimum pulping conditions were 150°C maximum temperature and for a pulping period of 1/4 hour.

Cotton linters:

Egyptian cotton linters were found to contain a high ash content of about 3.39%. Researches carried out showed that if the raw linters were subjected to a preliminary washing with a suitable synthetic detergent followed by an alkali digestion and blesching, the ash content will drop to 0.09%, the silica content of which amounts to 37.75%.

The optimum/for alkali digestion of the linters was found to be 1.5% alkali concentration at 130°C for 6 hours.

Cotton waste:

At the present the cotton spinning waste amounts to about

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10,000 tons per year. The purified material was used for the production of continuous filament rayon yarn and preliminary physical tests showed promising results and render the problem worth studying from the economical and industrial aspects. At the present most of this waste is used in producing condensed yarn.

Eucalyptus:

Eucalyptus rostrata was investigated as a raw material for production of a suitable viscose pulp. Although good results were obtained, eucalyptus cannot be considered a suitable raw material unless steps are taken to plant forests of suitable area to supply the needed wood.

Reeds (Phragmites Communis):

Chemically suitable viscose pulps were obtained from Egyptian Phragmi. Communis by prohydrolysis-sulphate pulping process. The resulting viscose yarn obtained from this pulp compared favourably in mechanical and chemical properties with commercial wood pulp.

It is to be noted that these researches have been carried out on a laboratory scale, steps are now being taken to bring the results of these researches to the industrial level. The test will be carried out in the new factory for paper pulp manufacture at Alexandria.

Manufacture of Polyamides and other synthetic fibers:

NYLON (6) is manufactured locally at the present from imported caprolactam. Enough caprolactam to produce 1750 tons yearly of Nylon 6 fiber is scheduled within the petrochemical industry project. The production of benzene from N-Hexane or from methycyclopentane are possobilities which may lead to nylon 6 or nylon 66.
Projects for the production of 350 tons of dacron and 5000 tons of acrylate fiber yearly are under consideration. Both fibers will be manufactured from intermediates obtained from the petrochemical industry.

On the other hand agriculture waste products such as corn cobs, wheat straw, bagasse, etc... might be utilized for the production of furfural from which adipic acid and hexamethynene diamine may be synthesized for the production of Nylon 66.

Blends:

Fibers may be blended for several reasons among which the following may be mentioned:

a) It is an important element in promoting fashion changes as consumers are tempted by the novelty or pleasant appearance of a textile on scale.

b) Blending is an important factor in producing fabrics of improved functionability.

c) Staple fibers may be blended so that colour effects may be obtained in dyeing.

In the UAR blends of man-made fibers with each other or with natural fibers as shown in Table 3 is increasing slowly but steadily and there is no doubt that blenders will play an important role in the world of textiles in the near future.

Yet their use will raise difficulties in spinning, weaving, dyeing and finishing. These difficulties will be tackled and solved in the new textile research centre, the foundation stone of which will be laid this year at Alexandria.

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